

CLAIMS

1. A nucleic acid molecule which encodes all or part of an *E. coli* flagellin protein, the molecule being capable of identifying the H serotype of an *E. coli* when hybridised to a gene of the *E. coli* which encodes a flagellin protein, provided that the molecule does not encode a flagellin protein expressed by the *E. coli* H1, H7, H12 or H48 type strains.
2. A nucleic acid molecule according to claim 1 wherein the molecule is derived from a *fliC* gene.
3. A nucleic acid molecule according to claim 1 including all or part of a sequence according to any one of SEQ ID NOs:1 to 68.
4. A nucleic acid molecule according to claim 1 consisting of all or part of a sequence according to any one of SEQ ID NOs: 1 to 68.
5. A nucleic acid molecule according to claim 4 wherein the molecule is from about 10 to 20 nucleotides in length.
6. A primer selected from the group of primers shown in Table 3.
7. A method of detecting the H serotype of *E. coli* in a sample, the method comprising the following steps:

(a) contacting a gene of an *E. coli* in the sample with a nucleic acid molecule according to claim 1 in conditions sufficient to allow the nucleic acid molecule to hybridise to the gene; and

(b) detecting a nucleic acid molecule which is hybridised to the gene, to detect the H serotype of the *E. coli* in the sample.

8. A method according to claim 7 wherein the hybridised nucleic acid molecules are detected by Southern Blot analysis.

9. A method of detecting the H serotype of *E. coli* in a sample, the method comprising the following steps:

(a) contacting a gene of an *E. coli* in the sample with a pair of nucleic acid molecules according to claim 1 in conditions sufficient to allow the pair of nucleic acid molecules to hybridise to the gene; and

(b) detecting a pair of nucleic acid molecules which is hybridised to the gene, to detect the H serotype of the *E. coli* in the sample.

10. A method according to claim 9 wherein the hybridised pairs of nucleic acid molecules are detected by the polymerase chain reaction.

11. A method for detecting the H and O serotype of *E. coli* in a sample, the method comprising the following steps:

(a) contacting a gene of the *E. coli* with a nucleic acid molecule derived from a gene encoding a transferase or a gene encoding an enzyme for the transport or processing of a polysaccharide or oligosaccharide unit, the gene being involved in the synthesis of a *E. coli* O antigen, in conditions sufficient to allow the nucleic acid molecule to hybridise to the gene;

(b) contacting a gene of an *E. coli* in the sample with a nucleic acid molecule according to claim 1 in conditions sufficient to allow the nucleic acid molecule to hybridise to the gene; and

(c) detecting nucleic acid molecules which are hybridised to the genes, to detect the H and O serotype of the *E. coli* in the sample.

12. A method according to claim 11 wherein the nucleic acid molecule of step (a) is selected from the group consisting of:

*wbdH* (nucleotide position 739 to 1932 of Figure 5),  
*wzx* (nucleotide position 8646 to 9911 of Figure 5),  
*wzy* (nucleotide position 9901 to 10953 of Figure 5),  
*wbdM* (nucleotide position 11821 to 12945 of Figure 5),  
*wbdN* (nucleotide position 79 to 861 of Figure 6),  
*wbdO* (nucleotide position 2011 to 2757 of Figure 6),  
*wbdP* (nucleotide position 5257 to 6471 of Figure 6),  
*wbdR* (nucleotide position 13156 to 13821 of Figure 6),  
*wzx* (nucleotide position 2744 to 4135 of Figure 6) and  
*wzy* (nucleotide position 858 to 2042 of Figure 6).

13. A method according to claim 12 wherein the nucleic acid molecule of step (a) is a primer

selected from the group of primers shown in Tables 8, 8A, 9 and 9A.

14. A method according to claim 11 wherein the hybridised nucleic acid molecules are detected by Southern Blot analysis.

15. A method for detecting the H and O serotype of *E. coli* in a sample, the method comprising the following steps:

(a) contacting a gene of the *E. coli* with a pair of nucleic acid molecules derived from a gene encoding a transferase or a gene encoding an enzyme for the transport or processing of a polysaccharide or oligosaccharide unit, the gene being involved in the synthesis of a *E. coli* O antigen, in conditions sufficient to allow the pair of nucleic acid molecules to hybridise to the gene;

(b) contacting a gene of an *E. coli* in the sample with a pair of nucleic acid molecules according to claim 1 in conditions sufficient to allow the pair of nucleic acid molecules to hybridise to the gene; and

(c) detecting pairs of nucleic acid molecules which are hybridised to the genes, to detect the H and O serotype of the *E. coli* in the sample.

16. A method according to claim 15 wherein the pair of nucleic acid molecules of step (a) is selected from the group consisting of:

*wbdH* (nucleotide position 739 to 1932 of Figure 5),  
*wzx* (nucleotide position 8646 to 9911 of Figure 5),

wzy (nucleotide position 9901 to 10953 of Figure 5),  
wbdM (nucleotide position 11821 to 12945 of Figure 5),  
wbdN (nucleotide position 79 to 861 of Figure 6),  
wbdO (nucleotide position 2011 to 2757 of Figure 6),  
wbdP (nucleotide position 5257 to 6471 of Figure 6),  
wbdR (nucleotide position 13156 to 13821 of Figure 6),  
wzx (nucleotide position 2744 to 4135 of Figure 6) and  
wzy (nucleotide position 858 to 2042 of Figure 6).

17. A method according to claim 15 wherein the nucleic acid molecules of the pair of step (a) are primers selected from the group of primers shown in Tables 8, 8A, 9 and 9A.

18. A method according to claim 15 wherein the hybridised pairs of nucleic acid molecules are detected by the polymerase chain reaction.

19. A method for detecting the H and O serotype of *E. coli* in a sample, the method comprising the following steps:

(a) contacting a gene of an *E. coli* in the sample with a nucleic acid molecule according to claim 1, in conditions sufficient to allow the nucleic acid molecule to hybridise to the gene; and

(b) detecting a nucleic acid molecule which is hybridised to the gene, to detect the H and O serotype of *E. coli* in the sample.

20. A method according to claim 19 wherein the nucleic acid molecule is according to any one of SEQ ID NOS: 9, 55, 57 to 65.

21. A method according to claim 7 wherein the sample is selected from the group consisting of a sample derived from food, a sample derived from faeces and a sample derived from a patient or animal.

22. A kit for identifying the H serotype of *E. coli*, the kit comprising at least one nucleic acid molecule according to claim 1.

23. A kit for identifying the H and O serotype of *E. coli*, the kit comprising:

(a) at least one nucleic acid molecule according to claim 1; and

(b) at least one nucleic acid molecule derived from and specific for a gene encoding a transferase or a gene encoding an enzyme for the transport or processing of a polysaccharide or oligosaccharide unit, the gene being involved in the synthesis of a particular *E. coli* O antigen.

24. A kit according to claim 23 wherein the at least one nucleic acid molecule of (a) is selected from the group

consisting of:

*wbdH* (nucleotide position 739 to 1932 of Figure 5),  
*wzx* (nucleotide position 8646 to 9911 of Figure 5),  
*wzy* (nucleotide position 9901 to 10953 of Figure 5),  
*wbdM* (nucleotide position 11821 to 12945 of Figure 5),  
*wbdN* (nucleotide position 79 to 861 of Figure 6),  
*wbdO* (nucleotide position 2011 to 2757 of Figure 6),  
*wbdP* (nucleotide position 5257 to 6471 of Figure 6),

wbdR (nucleotide position 13156 to 13821 of Figure 6),  
wzx (nucleotide position 2744 to 4135 of Figure 6) and  
wzy (nucleotide position 858 to 2042 of Figure 6).

25. A kit according to claim 24 wherein the nucleic acid molecule of (a) is a primer selected from the group of primers shown in Tables 8, 8A, 9 and 9A.

26. A method according to claim 9 wherein the sample is selected from the group consisting of a sample derived from food, a sample derived from faeces and a sample derived from a patient or animal.

27. A method according to claim 11 wherein the sample is selected from the group consisting of a sample derived from food, a sample derived from faeces and a sample derived from a patient or animal.

28. A method according to claim 15 wherein the sample is selected from the group consisting of a sample derived from food, a sample derived from faeces and a sample derived from a patient or animal.

29. A method according to claim 19 wherein the sample is selected from the group consisting of a sample derived from food, a sample derived from faeces and a sample derived from a patient or animal.

30. A kit for identifying the H serotype of *E. coli*, the kit comprising at least one nucleic acid molecule according to claim 6.

(b) at least one nucleic acid molecule derived from and specific for a gene encoding a transferase or a gene encoding an enzyme for the transport or processing of a polysaccharide or oligosaccharide unit, the gene being involved in the synthesis of a particular *E. coli* O antigen.